Chapter 6
On and about the Deficit Model in an Age of Free Flow

Bernard Schiele(✉)

Abstract This chapter shows that the notion of the 'deficit model' of science communication, which emerged in the post-war context, manifests a certain configuration of the science–society relationship, as well as a particular modality of scientific knowledge production—one that was primarily characterized by fundamental research. Its function is mainly ideological, as much justifying the type of knowledge highlighted as being an intermediary between science and the public sought by the media. The relegation of the deficit model, beginning in the 1980s, corresponds to a transformation of knowledge production, which was henceforth subject to the relentless pursuit of innovation. Adapting to this new role of science entails a resocialization of the actors. This happens through new and emerging patterns that can be adopted and which give the actors a socially valued way to engage in science–society interactions.

Keywords Deficit model, contextual model, ideology, science, social actor, society

For all intents and purposes, the history of the relationship of sciences[1] and society can be summarized as an exponentially growing integration, starting from the early convergence of the Renaissance, reinforced during the Industrial Revolution, and indelibly sealed by the fast-paced acceleration of scientific development in the 20th century (De Solla Price 1963). Today's 'knowledge society' is its natural, homogeneous outcome. Thus 'science links up with modernity, with the emergence of so-called modern societies' and their evolution.

Until now, '*progress* appeared as the product of what could be called the *effect of science,* that is, an imposed representation of nature and society that was increasingly

Interuniversity Research Center on S&T, Faculty of Communication, University of Quebec at Montreal, PO Box 8888, Centre-ville Station, Montréal, Québec H3C 3P8, Canada. Phone: 514 987 3000x4573, Fax: 514 987 7726, E-mail: schiele.bernard@uqam.ca

[1] I have chosen to refer to 'sciences' in the plural to reflect the diversity of fields and practices.

D. Cheng et al. (eds.) *Communicating Science in Social Contexts*,

moving toward scientific knowledge' (Fournier 1995: 7). This '*effect*' came to infuse everyday life for everyone, such that sciences—as Moscovici (1976: 22) pointed out over 30 years ago—'invented and proposed the major part of objects, concepts, analogies and logical forms that we use in our business, political or intellectual tasks'. The relentlessly debated questions about access to scientific production proved an inherent part of this integration movement, as the questions reappeared and were reformulated in a succession of contexts. Thus, attention came to focus less on those persistent questions than on the successive forms they adopted.

With this in mind, this chapter examines one such question, that of the *deficit model*, in two contexts of the 'sciences–society' relationship: first, the context that was explicitly formulated and self-imposed as the dominant theoretical model (this was roughly the period from the end of World War II to the early 1980s); and second, the period from the 1980s to the present, which saw its relegation and a search for replacement models. My inquiry here deals less with the theoretical validity of the deficit model—a question that I feel remains open—than the conditions that made it possible and, concomitantly, those which today serve to stigmatize it.

This chapter is divided into three parts: first, a brief history recalling that sciences and science disclosure have long trod the same path together; second, based on two earlier texts, an examination of the impact of scientific development (basic research) and media on the *discourse* of sciences dissemination in the public sphere; third, a look at the evolution of that discourse in terms of current transformations of the context of scientific production (Gibbons et al. 1995, Nowotny et al. 2002).

6.1 Historical Signposts

While sciences and society were originally dissociated—to state things simply—sciences and sciences disclosure were mutually confounded. Science was disseminated in and by its self-constituting movement, with the help of vernacular languages adopted by a fledgling scientific community to convey knowledge, and via the secret renunciation that surrounded alchemy, astrology and occultism. Progressively, secretly sharing among themselves and the general public, the scientific sages opted for exchange and the ensuing multiplier effect it made possible. Thus, the constitution and presentation of science to the public went hand in hand. Fontenelle [1686] 1990, signalling the Enlightenment with his *Entretiens sur la pluralité des mondes*, marked the start of the public dissemination of sciences, which we today call the 'public communication of science and technology' (PCST) but which has also been known as 'science popularization', 'parallel school', 'sciences disclosure' and so on (Jacobi and Schiele 1990). In creating a 'new genre', presenting scientific discoveries to the reasoning 17th century man, Fontenelle essentially meant that he was 'not a stranger to Science, nor the sage a stranger in the City' (Mortureux 1983: 110). Fontenelle's project anticipates ours, even if the term that denotes this practice and enables this type of social organization did not yet exist (nor, *a fortiori*, did PCST).

I do not propose to give a broad-brushed history of the public dissemination of science and technology (S&T). However, I will recall two of its major conclusions. First, the growing role that PCST played from the 18th century demonstrates the importance of the social function revealed by Fontenelle. As Meadows (1986) points out, PCST became a social necessity from the time that the generalization of the quantitative approach (formalization) in all domains covered by scientific research provoked both a closure of knowledge and a differentiation of scientific fields. Second, well before they sought autonomy and specificity, the activities of public presentation and dissemination of sciences were progressively self-affirmed as distinct practices of scientific exchange. The treatment of science by 19th century newspapers and magazines, with their series on science and their reader-attracting 'science wonders' columns, is illuminating in this regard (Raichvarg and Jacques 1991, Bensaude-Vincent 2000). Moreover, this movement of progressive integration of sciences and society was clearly a factor in the development, diversification and professionalism of these practices. And, while the role of media was already significant, it was only with the rise of mass media after World War II that PCST practices (then called 'popularization') would join a discourse that justified and legitimated them (Schiele 2007).

6.2 1945–1975: The Affirmation of Basic Research and the Rise of Mass Media

In the early 1960s, two discourses—later subsumed under the 'deficit model' moniker—infused the social debate. The first of these, essentially reflecting a consciousness-raised awareness of the role of science's productive forces and its structuring effect on society, placed science literacy, which was highly regarded, head to head with literary culture, qualifying one as progressive, the other as retrograde. The second discourse, coming from the media field, set three categories of actors in relation: at one extreme of the cultural spectrum, the scientists (and other creators of culture); at the other, the general public (the consumer of culture); and, between the two, the 'intermediaries' whose function it was to fill the gap separating the creators from the consumers.

These two discourses devolved from the development of basic research, which revealed all its formidable potential in the development of the atomic bomb during World War II. Exemplifying the two discourses, respectively, were C. P. Snow in England, and A. A. Moles and J.-M. Oulif in France.

6.2.1 The Deficit Model Formulated in a Science Field Perspective

In the early 1960s, Snow [1959] 1974 theorized what would later be called the deficit model by contrasting two cultures, scientists versus others, separated by a 'gulf of incomprehension'. Snow saw the situation as simple: on one side, the rising

science culture, with its system of gratifications; on the other, the literary intellectuals and non-scientists, essentially relegated to the social aspect. However, he railed, '[i]t is the traditional culture, to an extent remarkably little diminished by the emergence of the scientific one, which manages the western world' (p. 11). Hence, 'the scientific culture really is a culture not only in an intellectual but also in an anthropological sense. That is, its members [have] common attitudes, common standards and patterns of behaviour, common approaches and assumptions' (p. 9).

As Snow would have it, this prods scientists beyond their values, their religious convictions or even their basic social milieu to adopt convergent ways of thinking. Contrary to this, the literary intellectuals 'still like to pretend that the traditional culture is the whole of "culture"' (p. 15), while having no inkling of the depth, the complexity and the beauty of the scientific edifice:

> Their attitudes are so different that, even on the level of emotion, they can't find much common ground… In fact, the separation between the scientists and non-scientists is much less bridgeable among the young than it was thirty years ago… It is not only that the young scientists now feel that they are part of a culture on the rise while the other is in retreat. It is also, to be brutal, that the young scientists know that with an indifferent degree they'll get a comfortable job, while their contemporaries and counterparts in English or History will be lucky to earn 60% as much' (Snow [1959] 1974: 4, 17).

In Snow's defence, the physicists—his ideal-type of scientist—were then in the forefront of the scientific and public scene. In other words, the idea of the deficit model was formulated at a time when a particular conception of research, namely basic research, was becoming generalized and synchronized with the avowed interest in knowledge itself, for its own sake, for its inherent wonder and promising potential. The movement valorizing basic research had begun well before, in the effervescent spirit of the Enlightenment, and museums such as the Palais de la Découverte in Paris and Chicago's science museums were already highlighting and valuing scientific knowledge for its own sake. As stated by physician Jean Perrin, creator of the Palais de la Découverte: 'We first wanted to familiarize our visitors with the basic research that created science' (quoted in Rose 1967: 206 and freely translated here); it was only later that 'utilitarian research' would replace 'pure research'.

So the deficit model described by Snow depicts an idealized representation of sciences, but also a crystallization of values and attitudes of the relevant social groups and, more generally, of how they perceive themselves and how they relate to the other social groups and to society as a whole. It's a dual relationship: cognitive (observing a form of knowledge and culture) and social (valuing and justifying a way of organizing knowledge production). Thus, the deficit model could also be understood as a certain configuration of the 'sciences–society' relationship, with science embedded in a particular way in the social aspect. Today, as new production modes develop, one can certainly expect new forms of entrenchment (see below).

It is interesting to note in passing that Snow is happy to denounce a growing gap between scientific and literary culture, to the detriment of the second, without proposing any way out of the crisis, whether this would be to plead for a more dynamic teaching system (taking the example of the US) or to signal the emergence of a 'third culture', namely the human sciences, 'concerned with how human beings are living

or have lived,…such as the human effects of the scientific revolution'. 'It is probably too early to speak of a third culture already in existence [but w]hen it comes, some of the difficulties of communication will at last be softened: for such a culture has, just to do its job, to be on speaking terms with the scientific one' (Snow [1959] 1974: 70–71). One therefore hopes that the human sciences can play the same role of mediation in the knowledge field as do the 'intermediaries' beset by the media.

6.2.2 The Deficit Model in a Perspective of the Mass Media Field

After the war, newspapers renewed their interest in covering scientific information, which was then in demand and characterized by a generalized optimism. The technologies in medicine, energy, transportation and communications that had developed through the war effort were transposed into civilian use and helped to spur an economic and social change in post-war society. This was the beginning of what we tacitly call *les trente glorieuses* (Fourastié 1979).

However, researchers who hitherto had been very active in the public dissemination of sciences—such as the French science community, which had played an important role in the creation of the Palais de la Découverte in Paris in 1937 (Eidelman 1988a,b)—and who had been partly reduced to silence during the war, saw their role disputed by the science communication professionals. Meadows observed that it was during the wartime hostilities that journalists took over from the scientists—an outcome of the 'growing complexity of the knowledge concerned' (Meadows 1986: 400). Thenceforth, the abstract physical universe could no longer be decoded from common experience. Someone was needed to describe this formal universe and explain its meaning to everyone else, who would no longer have to master a complex arsenal of concepts. And the public audience for science had to be enlarged: traditional knowledge and know-how were deemed inadequate to deal with practical and intellectual tasks, thereby halting the penetration of spin-offs from the achievements of scientific and technical knowledge. To fully express Moscovici's meaning (1976): the genesis of a new common sense, henceforth science-driven, merged with basic social preoccupations.

Amid Snow's keen observations, Moles and Oulif (1967) echoed this movement and its accompanying discourse. They denounced a split in society and proposed to close the gap through the 'mediation' of a 'third man', an 'intercessor' whose function consisted of assuring 'optimal communication at low cost' between a small core of scientists and a majority of consumers. This posture designates the media as the natural mooring site of that mediation; its corollary is an intention to maximize the exchanges. Moles and Oulif also kill two birds with one stone by qualifying the mediation by its self-specifying practice. In so doing, they demonstrate on the one hand the rise of the power of the mass media and their interests, and on the other hand, more generally, the media's strategic positioning (since science popularization at that time represented a challenge for society). Moles and Oulif's model is exemplary, portraying and condensing a diffuse but full representation of the role of

media. The same movement occurred in the US: 'By the early 1960s, four major groups had responded to the post-war demand for popular science, each for its own reasons. Each group—the commercial publishers, the scientific organizations, the science writers, and the government agencies—defined "public understanding of science" in slightly different ways to serve their own needs' (Lewenstein 1992: 62). This representation is still active in the media field.

With the rise of the power of the media, the media practitioners sought, often successfully, to be in the forefront of the public scene, moving closer to the scientists—sometimes with the tacit support of the scientists themselves, who basked in the image purveyed—to become confined in a world of concepts and formalisms that kept them distant from the concerns of a society whose transformations, paradoxically, sprang from the application of discoveries by those same researchers. These media practitioners (science journalists) were perceived and still see themselves as the natural intermediaries between a world of science closed unto itself and a querying public with concerns and questions desperately unanswered—a public whose disparate, disjointed knowledge prevents it from comprehending the changes to every aspect of its life and, consequently, prevents it from forming opinions based on their implications. The media's communication of sciences thus became necessary to re-establish a balance and restore a right to speak.

6.2.3 Media Critique

6.2.3.1 Window Dressing

As soon as the demand for media to restore a genuine right to speak was affirmed, it was disputed (Schiele and Jacobi 1988, Jacobi and Schiele 1990). For Roqueplo, media communication became reduced to a 'show of the practice of sciences'. It accredited the 'spectacle, or show, of content' by the mediation not to the objective relationship between theory and practice, but to the exhibition of the 'subjective competency of men of science put on show'. Thus, the media offered a dual show: that of science 'content', and that of 'the authority that legitimates this content and its integration' in 'the field of daily experience' of the reader, the listener or the spectator (Roqueplo 1974: 110). They produce a 'window dressing': behind the window, very visible but apart, are 'the actors and the products'; in front of the window, kept at a distance, is the public. He concludes that the media leads at best to representations of knowledge, but never to a true appropriation.

But denouncing the 'window dressing', while reinforcing the non-reducibles of the deficit model, itself demands caution. As a true defender of a science answerable only to itself, Roqueplo remains enclosed in a concept in which sciences and society are two separate entities. From his angle of approach, the referential is the prior knowledge produced by scientists. It can only degrade or degenerate when the media seize upon it, with a lingering question on the extent of the knowledge gap. The facts would have us oppose media at school. Suddenly it is no longer possible for him to

conceive that media are operating symbolically, especially on a level other than that of knowledge dissemination (but not necessarily excluding it). Moreover, his approach is based on a scholastic conception of scientific knowledge, which sees the retention of rudimentary knowledge inculcated at school as the indicator of science culture.

Up to now, this robust school model has largely inspired general studies on science culture, such as those conducted by the National Science Foundation (until recently) and the European Commission (EC). It is not surprising that the general conclusion of these studies points to the public's low yet improving level of science culture. It should be added, however, that these surveys have been enriched over the years with questions about 'interest' in S&T, directing attention to such topics as 'trust' that cover a much broader spectrum than the simple retention of knowledge. The chosen parameters are habitually summarized as knowledge of basic science vocabulary, a certain mastery of the scientific method, and an awareness of the social impacts of S&T (Miller 1983, Miller et al. 1997).

6.2.3.2 Confinement in Average Culture

The role of media has also been broached in another perspective. For Maldidier and Boltanski (1969) and Maldidier (1973), the cultural work of PCST must be grasped at the focal point of a particular form of cultural property and conditions of inherent appropriation, themselves a function of conditions that may or may not modulate social mobility. To understand what is meant by 'average' culture—that which is produced and disseminated by the media—they would have us abandon the traditional distinction between internal analysis (the content of the cultural product) and external analysis (the production conditions, consumer characteristics, and so on). This caesura prohibits the use of information about the public to understand the characteristics of the product, or, inversely, favours only content analysis.

For them, the term 'PCST' negatively denotes its object; that is, in relation to a superior culture of which it is merely a degraded form. The notion of average culture avoids such a trap. It means cultural products for members of the middle class that fulfil their expectations and interests by aligning the intentions and constraints of producers of those goods to the interests of the middle class, the principal consumer. Average culture therefore reinforces everyone in their aspirations for learned culture through products that demand no prerequisite skills or prior learning to be assimilated. Those products, with their equivocal features as substitute products, create an allodoxia, a phenomenon of false cultural recognition—unlike products of learned culture that reach restricted groups composed of 'individuals with prior cultural competencies that pose and presuppose in a quasi-explicit way the elliptical or allusive character of the messages disseminated' (Maldidier 1973: 5).

For Maldidier and Boltanski, the expectations and interests of the public derive from earlier school training and not, as scientific communicators would suggest, from a need to know suddenly intensified by the acceleration of scientific progress.

They also immediately defined PCST as an extracurricular activity, an offshoot of the position it held in relation to teaching. Its consumption results from the alignment or (more frequently) dis-alignment between the cultural capital and intellectual, cultural and social dispositions (Bourdieu 1979, Bourdieu and Wacquant 1992), between the aspirations to scientific knowledge and the level attained in the hierarchy of scientific competencies. In the majority of cases, we are interested in PCST in so far as it maintains a professional mobility.

In showing that PSCT consumers mostly belong to the upwardly mobile or stable middle classes, Boltanski and Maldidier drew a relationship between the appropriateness of the content proposed and the aspirations of consumers. But far from permitting the middle classes to accede to scientific culture, PCST only offers an artificial culture, an approximate, incomplete knowledge. Amid this interplay, the science communicators who, with minimal constraints, take on the task of transmitting to a general public the scientific notions they consider vital to understanding current sciences encounter real difficulties. They must either disseminate scientific knowledge to a relatively limited public, or else communicate general information to a general public. Hence a two-edged discourse: pessimistic but lucid as to the public's interest in science knowledge; optimistic but utopian in reference to the general public's need for scientific knowledge. Science communicators hold contradictory proposals because they cannot know if their activity truly responds to a social demand. Instead, they evaluate their activity against the necessity for PCST, but without really being able to define it or say what it should be.

These critiques of the media's capacity to fill the gap between sciences and society, while pertinent, are nonetheless normative. They are part of a closed circle of understanding that is delineated by the media themselves and the sciences field itself. It is interesting to note in passing that most of the American work on this question during this period also continued to use this perspective on the media and the scientific field. Works on the responsibility of journalists are significant in this regard (Friedman et al. 1986, Goldsmith 1986, Nelkin 1987).

6.2.4 The Deficit Model—a Working Ideology

The question of the deficit model, taken epistemologically, is raised in the social conjuncture where it exists and exerts a presence, and not *in abstracto*. In this case, the post-war years can be characterized by two phenomena:

- The first was the emergence and formation of a social group in the media field, namely science journalists. In hindsight, we know they were part of a larger movement of autonomization of practices in disseminating sciences in the public sphere. We now refer to 'science communicators' to express the diversity of their expertise.

- The second was obviously the acceleration of professionalism in the scientific field[2] and the corresponding training of a social group: scientists attached to the apparatus of basic research (mainly the universities). This professionalism movement was already well under way from the 1930s, but it was mostly after World War II, having demonstrated the social necessity of the research, that the pace quickened. The movement was spurred by the model, observed by Vannevar Bush [1945] 1970, that valued excellence in basic research—a model that held sway in the US and elsewhere up to the mid-1970s.

If, as shown by Eidelman (1988a, b), the professionalism of the research was accompanied by a parallel development in science museums to disseminate this type of culture (the Chicago World Fair in 1933, the creation of the Palais de la Découverte in 1937, and so on), the predominant role in communication that scientists played at the turn of the 1930s was no longer possible at the end of the war. As we have seen, journalists replaced the scientists during the war and held on to that role afterwards. In any case, both these social groups presuppose an exteriority of sciences, outside the realm of the public and the literary intellectuals. The science communicators showed they were the only ones to build a rapprochement with society, while the scientists, bearers of the future, entered into future human sciences to fill a gulf that the literary intellectuals could not even understand.

As I have noted, the affirmation of a social necessity of sciences corresponds on one level to the redeployment of productive forces, and on another level affirms the communication of sciences with an expansion of the means of communication. The idea of the deficit model thus has more to do with the professionalism (or, in the case of the scientists, a new phase of professionalism) of two social groups demanding their domains, their places, and their own legitimacy (Bourdieu 1980). So two movements each led to the formation of specific devices and, correlatively, the establishment of a symbolic distance between them, and between each of them and the other groups of social actors with whom they interact. The deficit model idea characterizes the coincidence of these two movements, which is why the question of the deficit model as posed until now has been ideological, and not theoretical.

This ideological perspective was the one adopted in most of the work conducted up to now. According to Bauer et al. (2007), who opt for a critical approach, the deficit model hinges on two analogies. The first links the necessity of a science culture to schooling: knowledge of sciences (*science literacy*) must be part of the each person's knowledge kitbag, just like knowing how to read, write and count (*basic literacy*). The second analogy states that in a democracy, to be heard and contribute effectively to decision making, a voice must gain mastery of the political process and its apparatus (*political literacy*).

Thus the deficit model attributes lack of knowledge to an undereducated public—a public with a deficit of scientific capacity. This creates on the one hand a constant demand to beef up science education and introduce support programmes to develop

[2] The question of the professionalism of the research is a domain in itself. A past summary suffices for our purposes here.

science culture, and on the other the disqualification of a public deemed doubly ignorant by those who hold to a technocratic approach. For them, the deficit in science capacity sets rolling a deficit in democratic capacity: the public is excluded from participation in decision making on questions about S&T (Bauer et al. 2007: 80, passim).

Similarly, if 'knowledge sharing' is highlighted,[3] for Wynne (1995) the real objective is to perpetuate a power relationship based on the recognition of science's authority: 'A common thread has been anxiety among social elites about maintaining social control via public assimilation of the "natural order" as revealed by science'. In the field of 'science policy', the deficit model therefore reinforces the natural tendency of institutions to deem 'pertinent' and 'realizable' only that which meets their ends and fits their structures (Wynne 1991: 111) and to reject out of hand that which eludes. So they tend to perpetuate such discourse, in this case the discourse of science on the world, and within a particular social relationship. That relationship (between scientists on the one hand and the public on the other) is primarily unilateral, in the sense that one speaks (the learned sage) and the other listens (the public). It is also a totally unequal relationship between an organized institution and dispersed individuals, with actor one speaking on behalf of its collective being and the other listening as an individual (Lévy-Leblond 1994: 38).

Another weakness of the deficit model has always been that it considers knowledge for knowledge's own sake, independently of its conditions of production and application (that is, without its boundary conditions), so the framework that knowledge inhabits is not even envisaged (Ziman 1992). But quite obviously, as we have just seen, the deficit model is itself the expression of a modelling of certain conditions of production and application of scientific knowledge, and that modelling involves the modalities of public valorization. Equally obviously, the deficit model masks the fact that scientific knowledge is never complete, totally consistent or coherent (Wynne 1995). For example, the question of whether or not 'psychology' merits the status of science derives from contradictory conceptions of 'science'. 'In other words, "science" is not a sharply defined and special type of knowledge, which only starts to be misrepresented and misunderstood outside well-defined boundaries by people who simply do not know any better' (Ziman 1991: 100).

The boundary between sciences and society and the corresponding one between knowledge and lack of knowledge are today even more blurred than Ziman might suppose: the deficit model is in a 'bitter crisis', less because its intrinsic limitations have been demonstrated than because its ideological reason for being now lacks purpose. The conditions of scientific production have changed, and new means of communication have overwhelmed the mass media's sphere of influence.

[3] Certainly, the reshaping of the spirit of the Enlightenment is still palpable in the project of dissemination of sciences: the preoccupation—disinterested or not—to achieve a true sharing of knowledge is not insignificant. But to debate it here would require a development greatly exceeding the space allocated to me.

6.3 1980 to the Present: The Free Flow of Knowledge

6.3.1 Two Introductory Remarks

Revealed by the influence of mass media, the communications utopia progressively replaced that of the Enlightenment, starting in the 1970s (Breton [1992] 1997). It first came into its own in science museums: communicating with visitors took precedence over all other considerations. The San Francisco Exploratorium and the Ontario Science Centre in Toronto both opened in 1969 and were the precursors of this trend reversal. Note, incidentally, that the thrust of 'new pedagogies', which were very active at that time, also saw the pedagogical relationship first and foremost as a communication situation. Starting in the 1980s, the Bodmer Report (1985) was first in a long series that saw communication as the means and the end. The report roundly pummelled the knowledge gap, so dear to the deficit model, pleading for a rapprochement of scientists and public by diversifying the means and situations of communication to foster contacts between the two groups, and was no longer fixated solely on elevating the level of knowledge of the public as a whole.

Another trend also in play was the progressive relegation of fundamental research to an ancillary role. It is this second trend, along with the advent of a communications utopia, much more than the media critique or the demonstrated limits of the school model—at least that's the hypothesis of advanced work—that ultimately destabilized the deficit model and its corollary, the concept of public understanding of science (in its restrictive sense). The deficit model was replaced by a participatory logic that values citizen input and advocates open dialogue with scientists, in keeping with contexts and circumstances, to refurbish the image of a science whose contribution to progress was now considered problematic (SCST 2000). The question remains whether these are the real issues today.

6.3.2 Producing Knowledge Today

The increasing integration of sciences and society in recent decades has led to the establishment of a splendid apparatus for the production, storage, treatment and dissemination of knowledge with a view to specifying it, completing it, questioning and rejecting it. The apparatus works almost in real time, thanks to frequent interactions between researchers, laboratories, networks and countries made possible by new information and communication technologies. The OECD (2002: 249) notes that this direct confrontation of work results:

> …became characterized mainly by the increase in international exchanges in the very highly intensive sectors of research–development, by the increased circulation of technologies within multinational corporation networks and by the rise in science and technology cooperation.

The cooperation is reflected in the relentless increase in publications co-signed by authors from different countries. The proportion rose from 14.3% in 1986 to 31.3%

in 1999 (OECD 2002: 51–52). This integration, however, now depends as well on a knowledge production systematically placed at the service of innovation, considered to be its prime source and likewise that of socio-economic development. Noting a reversal of the dynamic, Castells (1996) concludes that the quest for innovation today takes precedence over the quest for knowledge, which tends increasingly to be produced in a context in which potential spin-offs are the sole interest.

There are at least three consequences of this new conjuncture. First, 'the knowledge society is characterized, certainly, by an exponential growth in knowledge, a mix of all disciplines, but even more, by a reconfiguration of production modalities and management' (CST 2002: 22). The 'problems to be solved', the 'needs of the economy and society', the 'uses of technology' thus overdetermine the scientific excellence offering or the technological performance (Valenduc and Vendramin [1997] 2003).

Second, as Gibbons et al. (1994: passim) observed, this recomposition of the role of research brings in its wake a 'diversification of places of knowledge creation', a 'heterogeneity of intervenors', a 'multiplication of exchange networks', an 'increased contextualization of research' and an 'increase in scientists' social responsibility'. The 'knowledge dynamic itself' is now 'marked by internal heterogeneity, growing diversification and the more transitory character of the production and dissemination devices of knowledge'. This results in the progress of the research itself—which has to operate with a veritable archipelago of disciplines, to use Jean-Marc Lévy-Leblond's metaphor, and with a range of supporting actors and institutions. Add to this 'the increasingly imperative contextualization not only of knowledge but in its production too' (Limoges 1995: 2), and:

> [n]ew organizational forms emerge, new types of centres, networks, teams, associations of researchers and other participants…whose existence may be relatively brief…Reduced reaction time, decentralized decision-making are typical of these groups created around a problem and which do not survive its resolution (Limoges 1995: 9).[4]

Third, universities and other places of knowledge production, in the direct line of such changes, are invited to create 'a strongly innovation-oriented environment

[4] This dynamic of current research must be re-examined in a wider perspective. On this topic, Cadix (2007: 94) states: 'the R&D structure of major groups worldwide has greatly evolved over the last 15 years, the share of pre-competitive research having increased significantly. This evolution signifies that enterprises have progressed autonomously in the field of scientific knowledge, leading to a kind of privatization of knowledge'. In 2006, 'for the first time', emphasizes Greco (2007a), investment in R&D exceeded US$1,000 billion (synopsis produced from OECD data (2006), National Science Foundation (2006) and *R&D Magazine* (2006)). In his view, this trend reflects an evolution initiated 20 years ago and marked by three events: increase in R&D investment, faster growth of investment in the private sector than the public sector (ratio 2:1), and transfer of bipolar research (Europe and North America) towards research that is at least tripolar with the arrival of Asia (Indo-Pacific) (Greco 2007a: passim). This demonstrates that basic research, while still playing a determining role, is increasingly deployed in the aforementioned systematic of innovation, which of course reveals the economic logics. And it is these logics at work in the social aspect which force the recomposition of the field and its practices and finally set them in motion—by circumscribing its margin of autonomy, and by stamping their mark on the forms and modalities of knowledge production.

where dialogue between…Education and Industry develops naturally,…a *milieu*… that facilitates the production and use of knowledge'. It is also suggested that they add a dissemination component to their research and training mission, so that the scientists involved in communication techniques can participate in a dialogue with the public. This is the objective pursued by the *Scientific Communications Act of 2007* (HR 1453), adopted by the US House of Representatives (Greco 2007b).

So the question of boundary between the scientific field and society, which we had thought resolved, rears its head again. While the emphasis on basic research had in essence self-enclosed the scientific field unto itself, the reversed polarity (that is, having other actors intervene as part of the process) forced it open and questioned its monopoly on legitimate authority. A scientific problem will of course receive a scientific answer in the scientific field, but the intermeshed interests of the actors retransmit a kind of 'authorized talk' as much as a 'talk of authority' (Bourdieu 1975).

Herein lies the current issue. The norms and practices of scientific rationality do not operate alone (if they ever did); nor do they any longer suffice to dissociate interiority from exteriority. Certainly, scientific participation always implies recognition of truth as a central value of the methodological canons that define rationality (Bourdieu 1975). And it is certainly in and by its self-regulation mechanisms, as in any other area, that the scientific field co-interacts with other contexts. However—and this is an important 'however'—the contemporary qualitative leap springs from the magnitude of interactions between the contexts and the *intricatio* of their co-evolution (Nowotny et al. 2002). Suddenly contemporary society is marked by pluralism and diversity, a rise in complexity and uncertainty (Friedman et al. 1999), and greater openness of 'systems of knowledge production'. This evolution, which brings a 'reconfiguration' of the role of 'knowledge' and 'actors', *de facto* restores a place to 'context', until now denied by the prevailing objectivism:

> Pre-existing contexts and deep social substructures, influence science-before-the-event, just as its future impacts anticipate science-after-the-event. The setting of priorities and the patterns of funding are not self-evident or self-referential; rather they are the result of complex negotiations in a variety of contexts, where expectations and vested interests, unproven promises and mere potentials play a role (Nowotny et al. 2002: 20).

However, the instantaneity and the volume of exchanges enabled by information and communications technologies not only transform practices in the scientific field, they are now a fact of life for society as a whole. Suddenly, this transversal and heterogeneous lay expertise in communication bites into the mass media's capital of authority, overwhelmed as it is, notably in the PCST field, by the de-multiplication of contexts precisely where communication is deployed (Breton and Proulx 2002).

The valorization discourse on fundamental research is now receding, its associated representations, notably the deficit model, declining in symbolic effectiveness and operativity accordingly—whence comes a renewed questioning of the relevance and validity of those representations. At the same time, the diversification of information sources reducing the mass media's impact on society are being viewed anew, and their capacity to fill a knowledge deficit is now jeopardized by a generalized access. But before scrutinizing the replacement models, we must consider the impact of current transformations on the organization of work.

6.3.3 Common Work Conditions

The evolution of the conditions of research work must be understood relative to those that govern the working world. In the dynamic of current massification, there is no distinction between the researcher's working conditions and those of the employee or worker. Researchers toil under the same shingle—at the whim of burgeoning or shrinking demand that determines whether their expertise is needed or not. 'Faced with a highly competitive and volatile economy', says Rifkin, viewing the situation in the US:

> [m]any companies are paring down their core labor pool and hiring temps in order to be able to add and delete workers quickly in response to seasonal and even monthly and weekly trends in the market.
>
> …Even scientists who, by virtue of their expertise, are widely thought to be immune to job insecurity in the high-tech knowledge economy are being reduced to temp work. On Assignment Inc, a temporary agency specializing in leasing scientists to companies ranging from Johnson & Johnson to Miller Brewing Company, has more than 1100 chemists, microbiologists, and lab technicians ready to lease around the country…The federal government has begun to follow the lead of the private sector, replacing more and more full-time civil servants with temps to save on overhead and operating costs' (Rifkin: 1995, 192, 193).

Certainly, places exist where the image is still 'competency' and 'legitimacy'. But amid this dire trend characteristic of the third industrial revolution, it is becoming increasingly the exception, according to Rifkin, to guarantee permanent jobs to a substantial number of researchers. For Rifkin, the new technologies mean an economic system reorganized through the massive use of modern technologies—automation—with a concomitant reduction in labour. The wave of re-engineering and automation answers a need to increase productivity in a globalized economic context. It translates daily into the laying off of increasing numbers of qualified workers, including scientists. This often leaves the sole perspective of the future as a succession of temporary jobs (Rifkin 1995).

This recomposition of the work sphere, Rifkin continues, also pursues a second objective: 'the movement toward contingent workers is part of a long-term strategy by management to cut wages and avoid paying for costly benefits like health care, pensions, paid sick leave, and vacation'. This leads some observers to ask if such an evolution will not ultimately 'reduce employee loyalty'—who are we kidding?—adversely affecting the business community down the road (Rifkin 1995: 191). There is growing uneasiness about the question of values in this new environment: substituted values, since they replace those that should be promoted in order to imagine a life in research.

6.3.4 Ongoing Acculturation

Such a dynamic stimulates the production of new knowledge, increases exchanges between research teams and intensifies the production of new goods and services, but it demands prior development of new skills and abilities, individual and collective.

In this spirit, Bauer (1998) showed that the times when the 'sciences–society' relationship was reformulated also reaffirmed the need for a science literacy, and that the two happen (through long economic cycles and structural adjustments) to emerge from crisis when the potential for innovation in S&T is in full swing. According to Bauer, the social valuing of S&T that accompanies the social debate characterized a requirement for acculturation to new competencies.

No one will dispute that innovation and mastery of S&T changes cannot be the product of a minority, however well educated it may be. They depend fundamentally on a collective competency. 'The capacity of a population with insufficient science and technology culture to act and react became…distinctly lessened'. And this 'capacity for action and reaction' is exercised in all 'places of decision' (CST 2002: 28). Each must be able to judge the quality of abundant and multiform information from its source, and then sort, evaluate and integrate it to extract useful knowledge or arrive at a decision (CST 2002: 5, 2 passim):

> The rapid advances in research raise many questions in terms of impact, acceptability, ethics and law. The answers to these question don't come solely from science and technology activity. Citizens are called upon, there again, to exercise their critical judgment and enter into the new relationships with the sciences.
>
> Indeed we go from a culture of sciences, with all its certainties and objectivity, to a culture of research, with the risks, complexity and uncertainties that characterize it (CST 2002, 25–26).

In this perspective, PCST would fulfil a dual function: on the one hand a destabilization of knowledge and the abilities till then required for entry into the scientific field and the workforce (a critical step in deconstructing an obsolete knowledge relationship), and on the other hand a function giving value to the emerging competencies (a positive step in establishing a new relationship). So the whole debate on the effect and limitations of the deficit model and its replacement by a discourse on the contextual model (or any other substitute model) in the PCST field can be seen as an adjustment of the function and reformulation of the discourse without actually deconstructing the ideological operativity as such.

6.3.5 Referential Shift: Which Science Literacy Today?

To examine this question, let's first return to the notion of science literacy, noted several times but not yet fully examined. This notion should be handled circumspectly, since it is 'like general culture and culture in general': like content, it draws on a determinable body of knowledge and competencies; as process, it designates their transmission via agents—the media among others—which means evaluating the scope, effectiveness and penetration. But to limit oneself to these two aspects 'is to forget that culture, be it general or scientific, primarily involves collective representations, and more precisely categories of thinking, symbols, values and models' (Fournier 1995: 7). As such, science culture—in the fashion of culture—is a complex of signs and meanings embedded in the devices of values, attitudes and

meaning that come to crystallize practices. Thus defined, science culture refers to a societal context (Jantzen 2001), to 'all the modes whereby a society appropriates science and technology' (Godin et al. 1998: 2) and, individually, to a person's attitudes, knowledge and skills (Schiele et al. 1994). In summary, this definition refers to the collective and individual dispositions on which are based the interpretations—and more generally the meaning—that the social actors give to their real, anticipated or imagined actions when they adopt a posture in a given social situation (in which they are called upon to participate or which they envisage doing).

Recent work (Bauer et al. 2007) points to three moments in time when science culture has been questioned. Initially limited to assessing the knowledge of basic scientific concepts considered to be known and mastered by the public, the objective widened until it encompassed the relationships between sciences and society. Beginning in the 1960s, it sought to measure *science literacy*. The National Science Foundation, the American Association for the Advancement of Science and others were compelled to intervene on this level. In successive studies by Science and Engineering Indicators (Washington D.C.), the assessment of knowledge of the 'scientific method' and mastery of 'scientific reasoning' left no lingering doubt as to what they considered important. After 1985, the main consideration was *attitudes* (public understanding), and since 1990 the operative for assessment has been *trust* in science.

So the surveys have gone from a limited understanding of science culture, reduced to disjointed elements of factual knowledge (Miller 1983), to a questioning of its symbolic and operative aspects. On the one hand, this means questioning the modalities of society's distancing from itself, and thence one of the forms of exteriority whereby 'it becomes visible to its members' (Quéré 1982) in a given situation; on the other hand, it is a questioning about the interactions between the fields of action in which the social actors evolve (for example, the logics at work in the interactions between associative experts and activists). While science literacy was seen at the beginning as the product of an exteriorized method, and deferred to a subjectless statement, it now involves contexts in which actors and situations evolve and adopt postures to speak about the objects they are dealing with. Today's knowledge is increasingly produced in a context of and with a view to optimization. Interest in its intrinsic value blurs into the value of its potential operationalization.

These aspects certainly interact with each other, but we can nonetheless question which one really depicts the 'sciences–society' relationship. Is it merely superficial discourse? Partly! In this case, Bauer[5] attributes a dual process: the acculturation to new skills, and the relegation of others deemed outmoded. Is it in terms of knowl-

[5] However, let us enlarge the angle of approach a little: to speak of the 'sciences–society' relationship is reductive. There is no 'one' 'sciences–society' relationship at any given moment, but a conjuncture of co-occurring relationships, interacting with each other. Bauer's work sheds light on only one of these components. Moreover, there is no reason *a priori* to think that these different relationships inter-articulate with each other to form a coherent whole. Various discourses can coexist, which explains why social actors sometimes have one opinion about science while researchers have another. For example, the growing interest in the environmental question, an

edge and the assimilation of modes of reasoning inherent in scientific thinking? Or does it concern the formation of the social identity? If that is the case, what is the ideal type of identity sought or desired in a given situation? On this precise point, Forgas defines social identity as:

> …an individual's knowledge that he belongs to a certain social group together with some emotional and value significance of his membership. In other words, an individual self-image and self-concept may be thought of as, to some extent, dependent on his group memberships, and in particular, on the differentiation which exists between his own group and others (Forgas 1981: 124).

Sennett (2006: 7) continues in the same vein: 'as a general rule identity concerns not so much what you do as where you belong'. To put it another way, the appreciation of competency is certainly a necessary indicator, but is not enough. The knowledge and skills in themselves—the fact of knowing this or that, or knowing how to do this or that—have meaning only in keeping with the social context where they operate, the situation in which they are mobilized, such that those situations are experienced by the actors, and the type of social inclusion that emerges.

Therefore, the social function of PCST has less to do with the dissemination of knowledge, the coming together of scientists and the public, or democratic participation in a society dominated by S&T than it has to do with the values mobilized to give value to a type of social identity sought and, by corollary, the adoption of a particular posture as much related to knowledge as its implementation. It is this interiorization of a social relationship with the sciences, much more than the mastery of specific knowledge, that really counts (without excluding its necessity, of course), for it is the *dispositio*—the manner of imagining, thinking and projecting oneself in a situation of appropriation, production and knowledge use—that achieves the potential.

6.3.6 Conditions of Emergence of New Values

These various aspects of the contemporary situation show that the strategies and means habitually deployed by PCST no longer fulfil the task in a society that has become at once more complex, more fluid and constantly subject to change—a direct consequence of its profound dynamic—and whose underlying values are recomposing rapidly.

The transformations in the work sphere are altering the values traditionally associated with it. They are also changing the relationship with knowledge

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awareness-raising of man's impact on the environment, illustrates the coexistence of opposing discourses among the actors. In a society responding to the dynamic of innovation, man is faced with the risk of a 'technician' evolution; but, while simultaneously inventing ways of using knowledge, he equally strives to measure and counter 'the effects … of his handiwork'! (Jantzen 1996: 26, passim): two logics—among others—operating in tension; both in the social dimension.

passed down from the Enlightenment. The Enlightenment[6] saw knowledge as constitutive to the individual subject: the acquisation of knowledge—a voluntary effort—transforming the knowing subject, enabling one to go beyond one's original condition, to tear away, to transcend it. Man was defined in terms of intrinsic qualities, in terms of an 'interiority' that determines his 'personality'. The role of the school and all processes of dissemination of culture consisted of 'training', an act of education on the 'self', and not in 'informing', since it is this 'interiority' which is the objective and challenge of education and culture. They are not reducible to the transmission of a quantity of know-how, abilities, competencies or information about sciences or any other domain, but to an interior 'modelling'.

Elsewhere, but in the same vein, there is the researcher (the ideal type of Snow and Bush) in his laboratory but also in a quest to 'go beyond', not only to extend a specific knowledge but more especially to transcend himself, since discovery means projecting oneself beyond a given state of knowledge deemed insufficient. In and by this process, which leads to discovery, he seeks to attain a higher level of understanding (that is, awareness)—an effort that completely engages the researcher. 'We know', wrote Bachelard [1938] 1970: 14), 'compared to earlier knowledge, by destroying ill-made knowledge, by surmounting that which, in the mind itself, forms obstacles to spiritualization'.

Before, in the mindset of the Enlightenment, to value and promote the sharing of a science culture was to have the public participate in this metaphor of the man 'acting within'. It was understood that this provoked encounter with knowledge would alter man's perception of science and its relationships with society as he came to know more, that access to a certain knowledge of sciences transforms him, that he becomes an 'other'. 'The classic humanist man', wrote Breton, 'is a man directed from within'. This conception sketched out such notions as 'depth of feelings' or 'riches of the interior life'. In discovering the 'subconscious', Freud helped nourish this concept of the human being as 'acting from within' (Breton 1997: 54). And this powerful metaphor was now opposed by the accompanying effects it had impelled and set in motion.

The paradox of the utopia of the Enlightenment can be summarized this way: today's society has retreated from the values it helped to create and build, since its organizational mode no longer serves them. Instead it helps to erase them. Even the ideological derivation of the deficit model remained subject to this metaphor—a metaphor that now rings false since it is no longer in sync with the conditions that affirm today's rising values.

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[6]For Laïdi (1999: 15–16; freely translated), the Enlightenment yields three principles: 'The first is that of mastering the destiny of the Man of Reason … The second is that of going beyond, tearing away from his original condition to transcend oneself, to surmount and achieve the universal…The third, finally, consists of believing and thinking that History has a meaning, that History is oriented, thus reinforcing the idea that men are beholden to the events they live, and they can orient them towards their objectives and their finalities'.

6.3.7 Recomposition of the Identity Relationship

What are those rising values? A first line of reply comes from Breton's analysis, in which he showed that the new communication utopia provides an 'alternative metaphor'. 'Modern man is first of all a "communicating being". His interior is fully exterior'. And the messages he reacts to are not from a 'mythic inside, but rather from his "environment"' (Breton 1997: 55, passim). The 'communicating' man is wholly overdetermined by his environment. 'He draws his energy and his vital substance not from his own inner depths, but from his capacity, as an individual "connected" to "vast communication systems", to collect, to process, to analyze the information needed to live' (Breton 1997: 56). The advent of a communication utopia as symbolic horizon therefore offered social actors a framework of interpretations of changes that would affect them, notably in the work world, starting in the 1970s—a framework that enabled the adoption of an identitary posture, recomposed around this alternative metaphor, mobilizing new norms and soliciting new rules in the daily interactions of participating actors (Weber [1920] 1967).

A second line is proposed by Sennett (2006). His analysis revealed a dissolution, or at least a considerable weakening, of the social link due to the evolving conditions of production and work. Sennett is very careful to state that his analysis deals only with certain firms (those most likely to benefit from leading-edge technologies) but points out that they are the ones that set the tone for organizational change. He shows that the end of the Bretton Woods accords in the early 1970s, which ultimately freed up capital, accompanied by a major international movement of those firms and the creation of new financial tools, translated into a radical transformation in the power relationships of enterprises to the benefit of investors and to the detriment of the frameworks that had hitherto ensured its development and operation. By wagering on short-term results, investors, indifferent to the culture of the organization, speeded its transformation. Increasingly at the whim of the marketplace, organizations had to become more dynamic, more flexible and able to change: 'Stabilty seemed a sign of weakness, suggesting to the market that the firm could not innovate or find new opportunities or otherwise manage change' (Sennett 2006: 41).

The ever-burgeoning communications revolution (*computerization*) added its own thrust to this accelerating movement of 'creative destruction' (Schumpeter [1942] 1975). It is characterized first by a rapid deployment of automation, a faster flow of activities, and time compression, with constant demand for ever shorter response times to remain competitive; and second by a reduction in middle management now considered superfluous: 'No group is being harder hit than middle management. Traditionally, middle managers have been responsible for coordinating the flow up and down the organizational ladder. With the introduction of sophisticated new computer technologies, these jobs become increasingly unnecessary and costly' (Rifkin 1995: 101). Why? Because communication technologies providing complete, unequivocal information at all levels of the organization simultaneously reduce the middle-level coordination work: 'e-mail and its derivatives [diminish] the

mediation and interpretation of commands and rules verbally passing down the chain of command' (Rifkin 1995: 101).

The result is a new form of centralization (Sennett 2006: 4–43) and at the same time greater flexibility, the most obvious effect of which is the modulation of production and externalization sequences. These changes clearly alter the organization of work, but to an even greater extent they affect the work experience of the individual social actor, and ultimately everyone. Suddenly, the interiorization of once-valued attitudes, skills and competencies blunts their once-valued meaning. The effort becomes obsolete, just as the modes of appropriation and mobilization of knowledge formerly needed to perform now outmoded tasks no longer have currency. For example, with widening automation, learning new skills takes on a whole other meaning:

> As automation spreads, the field of fixed human skills shrinks. Fifty years ago, holding a conversation with a machine about one's bank account would have seemed a sci-fi fantasy; today it's taken for granted. Here again appears the idealized new self: an individual constantly learning new skills, changing his or her 'knowledge basis'. In reality that ideal is driven by the necessity of keeping ahead of the machine. (Sennett 2006: 44; by 'new self' Sennett refers to the new idealized 'me', a social actor, obliged to compose and adapt to changes over which he has little power.)

The new social actor, unlike the earlier one, is flexible and mobile. He does not envisage a lifetime career in the same organization; he shuns dependence and keeps his distance from the state providence that institutionalized it, preferring to self-manage his children's education, his retirement investments and his medical coverage. In a way, he is a perpetual freelancer, maintaining an active extended network of relationships, without which his margin of manoeuvre would be reduced! At his task-oriented job, his mindset lets him pass readily from one task to another[7] (Rifkin 2000, Sennett 2006: 44–50, passim). And what he has to know in order to do it is self-referencing. For what comes next, no problem, he'll start from zero. When asked what knowledge is required to go from one job to another, Sennett replied 'Each time you start a new job, you need to fake it'.

[7] 'This new way of working permits what management-speak calls the delayering of institutions. By outsourcing some functions to other firms or other places, the manager can get rid of layers within the organization. The organization swells and contracts, employees are added and discarded as the firm moves from one task to the other. The 'casualization' of the labor force refers to more than the use of outside temps or subcontractors; it applies to the internal structure of the firm. Employees can be held to three- or six-month contracts, often renewed over the course of years; the employer can thereby avoid paying them benefits like health care or pensions. More workers on short contracts can be easily moved from task to task, the contracts altered to suit the changing activities of the firm. And the firm can contract and expand quickly, shedding or adding personnel … Taken together, these three building blocks of institutions—casualization, delayering, and nonlinear sequencing—shorten the organization's time frame; immediate and small tasks become the emphasis … Socially, short-term task labour alters how workers work together'. (Sennett 2006: 48–50).

6.4 Rethinking 'Sciences–Society' Relationships in the Current Context

Lévy-Leblond (1994: 41) pleaded to reverse the perspective 'for a problematic of science and technology enculturation aimed at changing society'. This would involve 'changing the science we do, its organization and its orientations'. In fact, it is the transformations of society—partly due to constant interaction with science—that change the organization and orientation of society, which changes the conditions of its enculturation, not the reverse.

That is why there is something surrealistic about asking researchers today what they think are society's expectations, without reference to the conditions of their vocation, neither mentioning it nor comparing it to other conditions elsewhere. How can we now mention 'sciences' without bringing in 'society' (as in the deficit model) and not reify the idea of a distinction between 'science' and 'society' as if they are radically dissociated from each other. The argument may be that this is well known and that talking about 'sciences' and 'society' today leads nowhere, that it is but a handy artifice of language. In any case, the studies measuring the extent of the distance between or rapprochement of public researchers and the science public are misleading. They re-actualize a spontaneous conception that produces, maintains and perpetuates the effect of a social distance between scientists and the rest of society that is refuted by present transformations (Bourdieu 1979). (But this spontaneous concept has promise, explaining in part why the applied policies to develop and valorize science culture have, until now, always fed into the deficit model as a conceptual framework and general principle of action.) So there's some work cut out ahead: to deconstruct these distance effects because they mask reality.

In this new perspective, it is useful to recall that the legitimacy of scientists to undertake risky research is more in question since they are no longer the sole contractors or participants. In short, one-way communication is no longer possible because henceforth this new organization of research will work with a generally more educated, more aware and alerted public (SCST 2000). Also, in a society overdetermined by sciences in which researchers are heading off in all directions, we can heartily anticipate a raft of debates and controversies. Amid all this, we must ask whether the future knowledge society will be a pacified society.

Whatever the future holds, new instances of negotiation (national or supranational) will be necessary to manage opposing discourses and instigate some sort of cooperation. Raising the educational level makes it necessary to invent the instances and processes of negotiation, in which knowledge dissemination comes into its own once it is linked to the issues and challenges. These will be new places of 'action–dissemination' that associations, pressure groups, NGOs and others try to establish in working to crystallize tensions. And this criss-crossing of actors and interests will surely scrutinize and question the status of sciences. All in all, this recomposition of the public role, dispersed into various interested or mobilized publics, will force a cohabitation of legitimacies, with arbitration becoming one of the real issues of our society.

However, while the public is increasingly present in the debates, this is undoubtedly also because the myth of 'progress' no longer operates as before (exit the Enlightenment). The public is ambivalent. It doesn't necessarily run counter to sciences or scientists. It is neither reactionary nor obscurantist. It simply considers that scientific progress does not necessarily mean enhanced well-being and better quality of life. That is why it hopes, and is finding ways, to be heard. While it is natural for researchers to want to share with the public their passion for scientific knowledge and truth, even to alert public opinion in certain circumstances today, such undertakings can only reconcile the interests of actors nurtured on other logics and engaged in other systems of action.

From this flows a co-extensive evolution of the conception of PCST and its role. The intrinsic theoretical limitations of the deficit model, conceptualized as a transitive communication relationship (scientist → media practitioner → public), clearly illustrate the difficulties of going from one conception of scientific culture to another. Today's interest is less in knowledge for its own sake than in its uses, and the heterogeneous array of participants in the debates will force PCST to refocus on the activities, competencies and skills of the actors, the situations they are part of, and the postures they assume, as well as their convictions, attitudes and values.

Finally, the time has come to go beyond the opposition between 'sciences' and 'society' because it does not sufficiently acknowledge that sciences are not 'elsewhere' but 'within' our society's organization. It is time to act and ensure that the current context of producing scientific knowledge renders a one-way communication null and void, dispels a now outmoded discourse, and admits once and for all that an ambivalent public is neither obscurantist nor anti-science, but certainly more critical since it feels that progress is no longer the answer. And it is time to recognize that the new media enable flexible forms of organization and action and a self-organizing effect that we are only beginning to understand.

If the contextual model, which is now replacing the deficit model, represents the new reality of scientific production and its dissemination in the public sphere, the conditions of possibility required in order to pose the question of the contextual model as a theoretical problem and not as an ideological answer will have come together. My objective in this chapter has been precisely to spark a discussion on these questions.

Acknowledgements The questions dealt with in this chapter were presented and discussed on several occasions, principally during the Science Communication Workshop (Venice, 12 and 13 January 2007) and during the Colloque Sciences et Société en Mutation, organized by CNRS (Paris, 12 February 2007). The author wishes to thank all participants for their remarks, comments and suggestions, which enriched the discussion of the topic.

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The Author

Bernard Schiele (schiele.bernard@uqam.ca)
Bernard Schiele PhD is a researcher at the Interuniversity Research Centre on Science and Technology, and Professor of Communications in the Faculty of Communication at the University of Quebec in Montreal, Canada. He often teaches and lectures in North America, Europe and Asia. He has been working for a number of years on the socio-dissemination of science and technology.
Bernard is a member of several national and international committees and is a regular consultant on scientific culture to governmental bodies and public organizations. He is also a founding and current member of the scientific committee of the PCST Network. He currently chairs the International Scientific Advisory Committee for the New China Science and Technology Museum, which will open in 2009.